

Appln. No. 10/678,484
Amdt. dated: June 27, 2005
Reply to Office Action dated April 4, 2005

Remarks/Arguments

These remarks are in response to the Office Action dated April 4, 2005. This reply is timely filed.

At the time of the Office Action, claims 1-30 were pending in the application. Claims 1-30 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting. Claims 1-9 and 11-30 were rejected under 35 U.S.C. §103(a).

I. Allowable Subject Matter

Applicant notes with appreciation that the Examiner has indicated that claim 10 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In response, Applicant has now amended claim 10 as suggested by the Examiner. Claim 10 is now believed to be in condition for allowance.

II. Double Patenting

Claims 1, 6-9, 13-17 and 22-30 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-23 of copending Application No. 10/656,949. Claims 2-5, 12 and 18-21 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-23 of copending Application No. 10/656,949 in view of U.S. Patent No. 6,515,235 to Moller (hereinafter "Moller"). A terminal disclaimer in accordance with 37 CFR §1.321(c) is enclosed to overcome the foregoing rejections. Please charge the fee associated with the filing of a terminal disclaimer pursuant to Fee Code 1814 to Deposit Account No. 50-2884. Accordingly, withdrawal of the double patenting rejection is respectfully requested.

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III. Brief Review of Applicants' Invention

Prior to addressing the Examiner's rejections on the art, a brief review of applicants' invention is appropriate. The present invention relates to a method and a system for controlling a phase delay of an RF transmission line by coupling a fluidic dielectric to the RF transmission line. A phase delay of the RF transmission line can be selectively varied by adjusting a distribution of first and second fluidic dielectrics present in a serpentine fluid channel coupled to the RF transmission line. Notably, the undulating pattern of the serpentine fluid channel configuration forms a plurality of fluid channel sections. The fluid channels sections are spaced apart from each other along a length of the RF transmission line, and are aligned generally transverse to a direction of signal propagation along said RF transmission line.

With the foregoing arrangement, the coupling of the fluid dielectric to the RF transmission line can be finely controlled. More particularly, with a plurality of individual segments or sections spaced apart along the length of the transmission line, the interaction of the fluid dielectric with the transmission line can be precisely controlled by varying the number of sections that contain a particular one of the fluid dielectrics.

V. Claim Rejections on the Art

Claims 1, 2, 5-9, 11, 13-18 and 22-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Moller, in view of U.S. Patent No. 3,701,058 to Smith (hereinafter "Smith"). Claims 3, 4, 12 and 19-21 are rejected under §103(a) as being unpatentable over Moller in view of Smith, and further in view of U.S. Patent No. 4,450,500 to Wollenschlager (hereinafter "Wollenschlager").

Moller discloses an electrical circuit employing a strip conductor and a fluid having a selected dielectric property coupled to at least a portion of the strip conductor. A dielectric property of the fluid effects one or more transmission characteristics of the conductor. Notably, Moller discloses that the fluid compensates for circuit performance due to aging or heating. Col. 5, lines 1-4 and 26-27. The Examiner notes that Moller shows the use of a fluid channel 180 that has a serpentine configuration. Specifically,

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the Examiner makes reference to Fig. 4 and col. 4, lines 48-63 in support of this assertion.

In response to the Examiner's rejection, Applicants have now amended claims 1, 16, 17 and 30 to more particularly recite the structure and arrangement of the serpentine fluid channel recited in those claims. For example, apparatus claims 1 and 16 have now been amended to recite that the claimed serpentine configuration forms:

"a plurality of fluid channel sections that are spaced apart from each other along a length of said RF transmission line and aligned generally transverse to a direction of signal propagation along said RF transmission line."

Method claims 17 and 30 have been amended to recite the step of:

"forming with said serpentine configuration a plurality of fluid channel sections that are spaced apart from each other along a length of said RF transmission line and aligned generally transverse to a direction of signal propagation along said RF transmission line so that said fluid dielectric is coupled to said RF transmission line along at least a portion of a length of said transmission line."

The forgoing recitations clarify the nature of the serpentine fluid channel. The relative importance of this serpentine configuration to the operation of the claimed invention derives from the much finer degree of phase delay adjustment that is possible with this structure. Relatively coarse adjustments in the movement of dielectric fluid through the serpentine channel can be made to have a very fine effect on the phase delay characteristics of the transmission line. The advantage is achieved by the relatively limited amount of fluid dielectric that is located close to the transmission line and the increased distance the fluid dielectric must move in order to transition from one

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transverse fluid channel section to the next. Such a fine degree of adjustment can be essential in many applications.


The remaining references cited by the Examiner do not disclose a serpentine fluid channel coupled to a transmission line conductor as recited in claims 1, 16, 17 and 30. For example, Smith discloses an apparatus including an expandable dielectric container in which dielectric fluid is disposed. The dielectric container is positioned in a waveguide to change the phase of electromagnetic waves propagated therein. The quantity of dielectric fluid introduced in the dielectric container is controlled to determine phase shift of electromagnetic waves. Wollenschlager discloses a variable capacitor that uses fluid dielectrics to control capacitance. Relative positions of first and second dielectric fluids are controlled within the capacitor by means of an adjustment cylinder. The fluids are prevented from mixing because they have different densities. Neither of these references discloses the combination of a serpentine fluid channel having the recited structure or coupled to a transmission line in the manner recited in claims 1, 16, 17 and 30. In view of the foregoing these claims are believed to be allowable over the cited art.

VI. Conclusion

Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. Nevertheless, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks, Applicants respectfully request reconsideration and prompt allowance of the pending claims.

6-27-05
Date

Respectfully submitted,



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